

REMARKS

Applicants thank the Examiner for total consideration given the present application. Claims 1-10 were pending prior to the Office Action. Claims 11-14 have been added through this Reply. Therefore, claims 1-14 are currently pending. Claims 1, 6, 11, and 13 are independent. Favorable reconsideration and allowance of the present application are respectfully requested in view of the following remarks.

FORM 1449 ACKNOWLEDGMENT REQUESTED

It is noted that the Examiner did not initial the “Ilder” reference cited under “OTHER DOCUMENTS” on the PTO-1449 filed on July 01, 2001. Accordingly, Applicant respectfully requests that such initialed form be provided.

35 U.S.C. § 103 REJECTION

A. Claims 1, 2, 4 and 5 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Miyamoto et al. (“Duobinary carrier-suppressed return-to-zero format . . .”, Optical Society of America, hereinafter referred to as “Miyamoto-OSA”) in view of Hait (U.S. Pub. No. 2002/0131134 A1). Applicants respectfully traverse this rejection.

For a Section 103 rejection to be proper, a prima facie case of obviousness must be established. See M.P.E.P. 2142. One requirement to establish prima facie case of obviousness is that the prior art references, when combined, must teach or suggest all claim limitations. See M.P.E.P. 2142; M.P.E.P. 706.02(j). Thus, if the cited references fail to teach or suggest one or more elements, then the rejection is improper and must be withdrawn.

In regard to independent claim 1, Applicants respectfully submit that none of the cited prior art references teaches or suggests, *inter alia*, “**a phase modulating unit that performs phase modulation on a data signal based on the carrier-suppressed-return-to-zero (CS-RZ) signal** to thereby convert the data signal into a phase-modulated signal; and an optical filtering unit that **filters out redundant frequency components included in the phase-modulated signal**”. *Emphasis added.*

Miyamoto-OSA merely teaches a conventional 40 Gbit/s-based wavelength division multiplexing (WDM) transport system which utilizes a duobinary carrier-suppressed return-to-zero (DCS-RZ) modulation format. According to Miyamoto-OSA, the DCS-RZ signal transmitter includes a conventional 42.7-GHz carrier-suppressed (CS-RZ) pulse generator and a conventional 42.7-Gbit/s optical duobinary data modulator. The CS-RZ pulse generator generates 42.7-GHz CS-RZ pulses which are simultaneously modulated with 42.7-Gbit/s optical duobinary signal (see page 1, section 1 and page 2, section 2.1).

The Examiner relies on the optical duobinary data-modulator to allege that Miyamoto-OSA teaches a **phase modulating unit** that performs phase modulation **on a data signal based on the carrier-suppressed-return-to-zero (CS-RZ) signal** to thereby convert the data signal into a **phase-modulated signal**. Applicants respectfully submit that the optical duobinary data-modulator cannot be properly interpreted as the claimed phase modulating unit. Miyamoto-OSA merely discloses that the optical duobinary data-modulator modulates the pulse generated by the CS-RZ pulse generator. Miyamoto-OSA is silent on whether phase modulation is performed on a data signal based on the CS-RZ signal to convert the data signal into a phase-modulated signal, as required by independent claim 1.

In addition, as acknowledged by the Examiner, Miyamoto-OSA **does not** teach an optical filtering unit that filters out redundant frequency components included in the phase-modulated signal. The Examiner imports Hait to fulfill the deficiency of Miyamoto-OSA in this regard.

Applicants respectfully submit that Hait fails to teach an optical filtering unit that filters out redundant frequency components included in the phase-modulated signal. As demonstrated above, the phase-modulated signal of the instant invention is produced by performing phase modulation on a **data signal based on the CS-RZ signal**. Hait is directed to hyper-dense transmission and reception of electromagnetic signals by utilizing photonic filtering to filter out lower frequencies from an electronic carrier to produce a photonic signal having bandwidth narrower than the bandwidth of the information modulated onto it (page 3, paragraph [0056]). Specifically, Hait is concerned in retaining the original modulated information of a carrier wave by filtering out unwanted sideband frequencies wherein the sideband frequencies are within the range of 10-25 GHz (see page 3, paragraph [0053] and page 4, paragraph [0062]). Applicants respectfully submit that Hait fails to teach a filtering unit for filtering redundant frequency components included in a **phase-modulated signal** wherein the phase-modulated signal is produced by performing phase modulation on a **data signal based on the CS-RZ signal**. Accordingly, it is respectfully submitted that claim 1 is distinguishable over Miyamoto-OSA and Hait.

Another requirement to establish *prima facie* case of obviousness is that there must be a suggestion or motivation within the cited reference(s) to modify the reference(s) as proposed in the Office Action. See M.P.E.P. 2143.01. The cited reference must be considered in its entirety including disclosures that teach away from the claimed invention. See M.P.E.P. 2141.02. If the

cited reference(s) teach away from the claimed invention, then the combination is improper and the rejection must fail.

In this instance, the combination of Miyamoto-OSA and Hait will fail because Miyamoto-OSA requires that the proposed DCS-RZ modulation format includes the same modulation bandwidth as the conventional non-return-to-zero (NRZ), which is two-thirds of the CS-RZ format. Thus, application of photonic filters of Hait, which filter out redundant frequency of 10-25 GHz, into the DCS-RZ modulated signals of Miyamoto-OSA will destroy the functionality Miyamoto-OSA's DCS-RZ modulation format since Miyamoto requires that 42.7-GHz CS-RZ pulses be simultaneously modulated with 42.7-Gbit/s optical duobinary signal (see page 2, continuation of section 2.1 of Miyamoto-OSA).

Applicants further submit that the two cited prior art references taken either alone or in combination do not recognize the problem solved by the Applicants' claimed invention or include all the features of independent claim 1 as demonstrated above. More specifically, Applicants' claimed invention solves the unrecognized problem of improving optical transmission capacity (please see page 3, lines 8-12 of the instant application). In order to solve such problem, the claimed invention requires, *inter alia*, "**a phase modulating unit that performs phase modulation on a data signal based on the carrier-suppressed-return-to-zero (CS-RZ) signal to thereby convert the data signal into a phase-modulated signal; and an optical filtering unit that filters out redundant frequency components included in the phase-modulated signal**" as illustrated in Fig. 1 or claim 1. Moreover, it is respectfully submitted that only a person skilled in the art who had access to the present application would be motivated to combine the teachings of the two cited prior art references in order to solve the unrecognized

problem disclosed in Applicants' specification. In other words, the only motivation to combine the two cited references in the way suggested in the Office Action is gleaned from the hindsight provided by Applicants' specification.

The Applicants respectfully submit that the Office Action is based upon a selective combination of features found in the two references, and that such selective combining is impermissible. As stated in *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143 (Fed. Cir. 1985), "When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself." It is respectfully submitted that the Office Action cites Miyamoto-OSA reference, and then utilizes the present application as a road map to selectively replace various features of Miyamoto-OSA.

The Office Action admits that Miyamoto-OSA does not disclose an optical filtering unit, but alleges that it would be obvious to combine Miyamoto-OSA and Hait to "improve bandwidth efficiency and prevent interchannel cross-talk" (see page 3, lines 3-4 of the Office Action). It is respectfully submitted that the rejection of claim 1 is a blatant string of substitutions gleaned from and motivated by the Applicants' own patent application. The Office Action has not shown that the prior art provides the teaching or suggestion to make the claimed combination and the reasonable expectation of success. The suggestion to make the claimed combination and the reasonable expectation of success cannot be based on Applicants' disclosure. Accordingly, it is respectfully submitted that claim 1 is patentable over the impermissible combination of references cited against claim 1.

Therefore, for at least these reasons, claim 1 is distinguishable from the combination of Miyamoto-OSA and Hait. Claims 2, 4, and 5 depend from claim 1. Therefore, for at least the reasons stated with respect to claim 1, claims 2, 4, and 5 are also distinguishable over the combination of Miyamoto-OSA and Hait.

B. Claims 6-10 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Miyamoto et al. (EP 0 977 382 A2, hereinafter referred to as “Miyamoto-EP”) in view of Ito (US 6,650,846 B1) and Hait (U.S. Pub. No. 2002/0131134 A1) and in further view of Way (US Pub. No. 2002/0021464 A1). Applicants respectfully traverse this rejection.

As mentioned above, for a Section 103 rejection to be proper, a prima facie case of obviousness must be established. See M.P.E.P. 2142. One requirement to establish prima facie case of obviousness is that the prior art references, when combined, must teach or suggest all claim limitations. See M.P.E.P. 2142; M.P.E.P. 706.02(j). Thus, if the cited references fail to teach or suggest one or more elements, then the rejection is improper and must be withdrawn.

In regard to independent claim 6, Applicants respectfully submit that none of the cited prior art references teaches or suggests, *inter alia*, “**a signal carrier-suppressed pulse modulating unit** that performs signal carrier-suppressed pulse modulation on the phase-modulated signal to thereby convert the phase-modulated signal into a phase modulated carrier-suppressed-return-to-zero signal; and **an optical filtering unit** that filters out redundant frequency components included in the phase modulated carrier-suppressed-return-to-zero signal.” *Emphasis added.*

Miyamoto-EP merely discloses a conventional optical transmission system which includes an input terminal for receiving non-return-to-zero (NRZ) electrical signal and

converting the NRZ electrical signal into RZ optical signal (col. 6, lines 5-10). Fig. 26, relied upon by the Examiner merely discloses that the continuous optical signal generated by the optical source 5 is modulated with a clock pulse which is synchronized with transmission rate in the first optical intensity modulator 31 and then by the second optical intensity modulator 32. Finally, the output of the second optical intensity modulator 32 is phase modulated with a pre-coded NRZ signal by the phase modulator 40 to provide an RZ optical signal (col. 17, lines 8-21). Applicants respectfully submit that Miyamoto-EP is silent on whether there is a **signal carrier-suppressed pulse modulating unit** that performs signal carrier-suppressed pulse modulation on the RZ optical signal to thereby convert the RZ optical signal into a phase modulated carrier-suppressed-return-to-zero signal.

The Examiner relies on Ito to allege that it is well known to interchange the positions of pulse modulating units and phase modulating units. Applicants respectfully submit that regardless of the positions of the pulse modulating units and phase modulating units, Ito fails to teach a **signal carrier-suppressed pulse modulating unit** that performs signal carrier-suppressed pulse modulation on the RZ optical signal to thereby convert the RZ optical signal into a phase modulated carrier-suppressed-return-to-zero signal. Ito merely discloses a conventional intensity modulator that modulates the intensity of signal light from a light source based on NRZ data and modulating polarization of the output of the intensity modulator (see abstract).

In addition, as acknowledged by the Examiner, Miyamoto-EP **does not teach an optical filtering unit** that filters out redundant frequency components included in the phase modulated carrier-suppressed-return-to-zero signal. The Examiner imports Hait to fulfill the deficiency of

Miyamoto-EP in this regard. As demonstrated above with respect to claim 1, Applicants submit that Hait also fails to fulfill this deficiency of Miyamoto-EP.

As previously discussed, Hait is directed to hyper-dense transmission and reception of electromagnetic signals by utilizing photonic filtering to filter out lower frequencies from an electronic carrier to produce a photonic signal having bandwidth narrower than the bandwidth of the information modulated onto it (page 3, paragraph [0056]). Specifically, Hait is concerned in retaining the original modulated information of a carrier wave by filtering out unwanted sideband frequencies wherein the sideband frequencies are within the range of 10-25 GHz (see page 3, paragraph [0053] and page 4, paragraph [0062]). Applicants respectfully submit that Hait fails to teach **an optical filtering unit** that filters out redundant frequency components included in the phase modulated carrier-suppressed-return-to-zero signal. As demonstrated above, Miyamoto-EP and Hait fail to teach or suggest the above identified claim element. Ito and Way have not been, and indeed cannot be, relied upon to correct at least this deficiency of Miyamoto-EP and Hait.

Furthermore, Applicants respectfully submit that there is no motivation to combine the four references. Specifically, the Applicants respectfully submit that the Office Action is based upon a selective combination of features found in the four references, and that such selective combining is impermissible. As stated above, in *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143 (Fed. Cir. 1985), the court states “When prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself.” It is respectfully

submitted that the Office Action cites the Miyamoto-EP reference, and then utilizes the present application as a road map to selectively replace various features of the Miyamoto-EP reference.

The Office Action admits that Miyamoto-EP does not disclose that the pulse modulating unit is positioned after the phase modulating unit as required by independent claim 6, but alleges that it is well known to interchange the positions of pulse modulating unit and phase modulating unit and cites Ito to support such contention. The Office Action further admits that the combination of Miyamoto-EP and Ito fails to teach an optical filter to filter out redundant frequencies, but alleges that it is well known in the art to filter out redundant frequencies in order to efficiently utilize bandwidth and prevent channel interference and cites Hait to support such contention. (See page 2, line 20 – page 3, line 14 of the Office Action.)

It is respectfully submitted that the rejection of claim 6 is a blatant string of substitutions gleaned from and motivated by the Applicants' own patent application. The Office Action has not shown that the prior art provides the teaching or suggestion to make the claimed combination and the reasonable expectation of success. The suggestion to make the claimed combination and the reasonable expectation of success cannot be based on Applicants' disclosure. Accordingly, it is respectfully submitted that claim 6 is patentable over the impermissible combination of references cited against claim 6.

Accordingly, it is respectfully submitted that claim 6 is distinguishable over Miyamoto-EP, Ito, Hait, and Way. Claims 7-10 depend from claim 1. Therefore, for at least the reasons stated with respect to claim 6, claims 7-10 are also distinguishable over the combination of Miyamoto-EP, Ito, Hait, and Way.